QUALITY ASSURANCE PROJECT PLAN

FOR:

Arkwood, Inc. Superfund Site

November, 2011

PREPARED FOR:

McKesson Corporation
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OXFORD PROJECT NO.: MCK-O&M-10005

INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the activities of an environmental data operations project involved with the acquisition of environmental information whether generated from direct measurements activities, collected from other sources, or compiled from computerized databases and information systems. The QAPP documents the results of a project's technical planning process, providing in one place a clear, concise, and complete plan for the environmental data operation and its quality objectives and identifying key project personnel. A QAPP communicates, to all parties, the specifications for implementation of the project design and to ensure that the quality objectives are achieved for the project. It does not guarantee success every time, but the prospects are much higher with a QAPP than without one.

The QAPP is divided into four basic element groups: Project Management; Data Generation and Acquisition; Assessment and Oversight; and Data Validation and Usability. Each group consists of standard elements that pertain to various aspects of the project. The QAPP addresses the basic elements defined and described by the following components:

- who will use the data;
- what the project's goals/objectives/questions or issues are;
- what decision(s) will be made from the information obtained;
- how, when, and where project information will be acquired or generated;
- what possible problems may arise and what actions can be taken to mitigate their impact on the project;
- what type, quantity, and quality of data are specified;
- how "good" those data have to be to support the decision to be made; and
- how the data will be analyzed, assessed, and reported.

A. Plan Distribution

All personnel involved in the project should retain or have access to the current version of the QA Project Plan. This may include the Project Manager, laboratory manager, field team leader, QA Manager, data reviewers, and any essential contractor and subcontractor personnel involved with the project. For the Arkwood Project, the QAPP will be distributed to:

- Ms. Jean Mescher, Project Coordinator, McKesson Corporation
- Mr. James Fleer, Operations and Maintenance Engineer, Oxford Environmental and Safety
- Ms. Penny Semberski, Quality Assurance/Quality Control officer, Arkansas Analytical, Inc.

Project/Task Organization

The individuals participating in the project and their specific roles and responsibilities are discussed below:

Jean Mescher, Project Coordinator - the primary decision maker for the project and the primary user of the data to determine whether or not further action is required at the site under the direction of the USEPA. Ms. Mescher's duties are:

1. Overall responsibility for the site operations and activities
2. Communication with regulatory agencies and media
3. Reviewing and approving the QAPP and subsequent revisions in terms of program specific requirements
4. Reviewing reports and ensuring plans are implemented according to schedule
5. Making final project decisions with the authority to commit the necessary resources to conduct the project

James Fleer, Operations and Maintenance Engineer and Quality Assurance Manager (QAM) - The QAM will be responsible for development and implementation of the QAPP and subsequent revisions. The QAM will provide QA technical assistance to the Project Manager and will conduct QA audits of the project. At this time, no QAM audits are planned; however, the Project Manager can request an audit by the QAM.

The Operations and Maintenance Engineer will coordinate the project activities and specific responsibilities will include:

1. Developing the QAPP.
2. Coordinating field and laboratory activities.
3. Conducting the project activities in accordance with the QAPP and work order.
4. Validating the field data.
5. Reporting to the Project Manager regarding the project status.

Penny Semberski, Quality Assurance/Quality Control Officer, Arkansas Analytical Inc. - Ms. Semberski is responsible for coordinating the analysis of the samples and laboratory validation of the data. She will coordinate the receipt of the samples at the laboratory, select the analytical team, ensure internal laboratory audits are conducted per the Arkansas Analytical Inc. QA Manual, and distribute the applicable sections of the QAPP and subsequent revisions to members of the analytical team. The complete Arkansas Analytical Inc. QA Manual was reviewed by Oxford Environmental and Safety, Inc. in November 2010. Ms. Semberski will also report laboratory problems affecting the project data to the Oxford Environmental and Safety, Inc. Operations and Maintenance Engineer and QA manager.

Task Description and Schedule

The objective for the on-going operations at the Arkwood Site is to monitor the pentachlorophenol concentrations emanating from the New Cricket Spring (a karst spring) and in the effluent from the treatment system. The general location of the Arkwood Site is shown in the Appendix. Samples from the spring and treatment system effluents are currently collected on a monthly basis. This frequency may be reduced in the future. The samples are collected directly from the streams at a point near the emergence for each stream. The karst spring emerges from a rock outcropping and is sampled from a point where the spring fully emerges from the rock formation. Flow rates in the spring range from less than one gallon per minute to more than 1,000 gallons per minute but typically range from less than one gallon per minute to approximately 40 gallons per minute. The treatment system effluent is sampled from a weir at the discharge point from the treatment system. Flow rates from the treatment system typically range from approximately 20 to 40 gallons per minute.

Surface water samples will be collected by dipping the sample containers directly into the stream.

Non-critical data may be collected from the influent and/or effluent streams and may include temperature and pH. This information may be used to supplement the pentachlorophenol data.

A complete equipment list is provided in section B. Standard one-liter wide-mouth amber bottles will be used for the water samples. See the Specialized Training Requirements/Certification section below for personnel requirements.

The assessment tools needed for this project will include data verification and validation of all data submitted to the EPA Project Manager. The sample collection activity will be performed monthly. Sampling should generally be performed approximately mid-month for consistency. The monthly sampling and reporting process, including laboratory analysis, should be completed within 30 days of each sampling event.

Required QA records are described in the Documents and Records section below. Laboratory QA records will be developed and maintained in accordance with the laboratory QA manual. QA reviews will be performed by the QAM on an "as-needed" or "as-requested" basis. QA reviews will be maintained within the Project files.

A discussion of standard operating procedures identified in the QAPP can be found in Section B.

Data Quality Objectives for Measurement Data
Valid data of known and documented quality is needed to monitor the pentachlorophenol concentrations in the spring and treated water streams. The data will be compared to the decision limits to determine if the treatment processes is performing adequately.

The null hypothesis is that the New Cricket Spring stream is impacted with pentachlorophenol and will require remediation. For the spring water matrix, the lower bound of the expected pentachlorophenol concentration is less than 5.0 ug/L and the upper bound is 250 ug/L. For the effluent water matrix, the lower bound of the expected pentachlorophenol concentration is less than 5.0 ug/L and the upper bound is 10 ug/L.

Data Quality Indicators:
If the collected data are within the expected bounds described above, the following data quality indicators will be applicable and remediation decisions can be made with this data. For the spring and effluent water matrices, currently one decision unit will be collected per month. Data quality indicators include precision, accuracy, representativeness, comparability, and completeness. Definitions for each of these data quality indicators can be found in Attachment A.

Precision. The precision at this site will be calculated as the relative percent difference (RPD) for laboratory duplicates (matrix spike/matrix spike duplicates) for the water samples. The frequency for laboratory duplicates is one sample per month. The acceptance criteria for the laboratory duplicates are defined in the laboratory QA manual. One co-located field duplicate of either the spring or the effluent water matrix will be collected at this site for use in the QA process. The laboratory Project Manager will evaluate the replicates during the review and verification process.

Accuracy. Accuracy will be determined for pentachlorophenol in water with a performance evaluation (PE) sample, analyzed to determine any possible bias. The laboratory will analyze a matrix spike and a matrix spike duplicate to verify the effect of

the matrix on analytical bias. The percent recovery for the PE sample (matrix spike) will be calculated and the acceptance criteria are defined in the laboratory QA manual

Representativeness. Representativeness will be assured over the course of multiple events by using a statistically significant number of samples.

Completeness. To generate complete data, 100% of the samples must be collected and analyzed. Re-sampling will occur if any sample from the spring or effluent stream is not collected or if the sample is destroyed in transit or prior to analysis because each sample is needed to measure the effectiveness of the treatment system.

Comparability. For this project, comparability will be addressed through the use of common and accepted sampling and analytical techniques and by reporting data in standard units.

Special Training Requirements/Certification

Specialized training for field sampling and analyses and off-site analyses and validation has not been identified as necessary during the planning of this project. The Oxford field team lead will be responsible for ensuring that all members of the field team have valid and current specialized training required by the OSHA regulations. The EPA Project Manager will be responsible for ensuring that all EPA personnel have valid and current specialized training required by the OSHA regulations as a pre-requisite for site visit(s). Specific certifications have not been identified as necessary during the planning of this project.

Samples will be transported from the site and shipped to the lab as directed by the site health and safety plan (HSP) prepared by the contractor. These transporting and shipping procedures will be in compliance with the Department of Transportation regulations.

Documents and Records

The records for this project will include miscellaneous correspondence, field logs and field data worksheets, and laboratory analytical reports. Field logs will be recorded with no more than one entry per page. Field logs will include observations about weather conditions at the site when samples are collected and field analyses are conducted. Any other pertinent observations or deviations from the procedures in this QAPP, deemed noteworthy by any member of the field team will also be recorded in the field log book. Field data worksheets will be used to record all field measurements. Each page of the field logs and field data worksheets will be dated and signed by the person making the entries.

One laboratory analytical report will be generated for all the samples received by the laboratory and signed by a designated representative of the laboratory. The analytical data report will include an original signed report of the analytical results, a tabular report about the analysis, complete chain of custody form, and any other documentation received with the samples. A summary of the calibration data and laboratory quality control data will also be included in the analytical report. The raw analytical data (e.g., instrument printouts and manual records) will be available upon request. The laboratory analytical report will be submitted to Oxford. Oxford will review the analytical report and submit the report to the Project Manager within 30 calendar days after collection of the samples and upon verification of its completeness. The tabular report will describe at least:

1. the dates of sample receipt, preparation, and analysis,
2. the condition of the samples upon receipt,

3. sample preparation and analytical procedures,
4. any problems encountered during sample handling, storage, preparation, or analysis, and their solutions,
5. any deviations from standard operating procedures, and,
6. information regarding the quality of the reported analytical.

B. Sampling Process Design

This is an operations and maintenance project to monitor the efficacy of the treatment process and track the influent concentrations to the treatment train. The sample collection design is such that homogeneous areas (monitoring points) will be tested and evaluated. A grab sample will be collected from each monitoring point. Collection of grab samples from the same point over time will assure that the results are representative within each monitoring point. Use of standard methods and technically accepted methods will assure that data may be comparable to other sources of data. See Attachment A for a site map.

Schedule

Sample collection will be currently performed monthly. In general, samples will be collected during the mid-month time period. Sample collection will be performed between Monday and Thursday to allow for shipping to and receipt by the analytical laboratory during normal business hours. If sample shipment cannot be performed between Monday and Thursday, special receiving arrangements can be made with the laboratory for after-hours receiving. After-hours receiving must be arranged prior to performing the sampling event.

Sample collection should take approximately two to three hours. The samples will be shipped overnight to the analytical laboratory for analysis. Laboratory results will be sent to the Oxford representative within 30 days of sample receipt.

Equipment

2 1L amber wide-mouth jars
1 Cooler for shipment of water samples
1 Combination water quality meter (used occasionally for non-critical data collection)
Field sheets

Procedure

Samples will be collected from each monitoring point. The samples will be grab samples collected by immersing the sample container into the monitored stream until the sample bottles are at least 80% full. Care will be taken to minimize the turbulence of the sample entering the sample container.

Certainwater quality characteristics (pH and temperature) may be periodically made in the field. This information may be used to supplement the pentachlorophenol data.;

Sampling Methods Requirements

Water samples will be collected to determine the concentration of pentachlorophenol in water within the New Cricket Spring and treatment system effluent. Water quality characteristics may be collected to support the critical measurement of pentachlorophenol in water.

Analytical Methods Requirements

The measurement of pentachlorophenol in the samples will be performed at the analytical laboratory. Table 1 summarizes the analytical methods to be used.

Once the samples are received and logged in at the laboratory, the samples will be analyzed using EPA Method 8270D. EPA Method 8270 describes the sample preparation of water samples for semi-volatile analysis. Laboratory procedures describe the sample analysis for semi-volatile compounds including analytical method performance criteria and corrective actions for analytical failures. If any data are lost or do not meet the method performance criteria, the analytical laboratory QA Manager will contact the Oxford QAM prior to submission of the data.

Table 1. Summary of Methods

Analyte	Pentachlorophenol
Matrix	Water
Project Action Limit	9.3 ug/L
Project Quantitation Limit	5.0 ug/L
Analytical SOP Analytical Method	EPA Method 8270

Quality Control Requirements

The laboratory quality control (QC) procedures and associated criteria are contained in the laboratory QA manual. The laboratory QC samples and control limits identified in the manual were reviewed by the project personnel. The quality of the data generated using the QA manual will provide analytical data of a sufficient quality for this project. The field QC samples will include a matrix spike/matrix spike duplicate sample obtained from either the New Cricket Spring or effluent monitoring points.

Laboratory Quality Control

The lab will be required to analyze a method blank, a matrix spike/martix spike duplicate set, and calibration curve verification (CCV) sample for each matrix. The method blank must be below the reporting limit; the CCV and the PE sample must be within 10% of the expected value.

Instrument/Equipment Testing, Inspection, & Maintenance Requirements

The only field equipment requiring testing, inspection, and maintenance is the water quality meter. This meter will be used from time to time to measure pH and temperature for water samples while in the field. The manual for the specific instrument used will describe the procedures for testing, inspecting and calibrating the meter. These procedures include a battery check, verification that the meter was successfully calibrated during its previous use, and ensuring preventative maintenance has been completed per the manufacturer's recommendations.

An inspection checklist and initial calibration check will be completed by a field team member upon checkout of the meter. A maintenance kit which includes extra batteries, calibration standards, and commonly needed spare parts will also be obtained upon checkout. Any preventive or corrective maintenance done will be documented in the equipment log. If the meter fails the initial testing and inspection, an alternative meter will be used as the backup instrument.

The laboratory QA manual addresses the testing, inspection, and maintenance for the analytical instrument(s). These procedures include reviewing the instrument log for any notations regarding problems experienced during the previous use and verifying the preventative

maintenance has been completed per the manufacturer's recommendations. Any preventive or corrective maintenance done will be documented in the maintenance log.

Instrument Calibration & Frequency
The Water Quality meter will be calibrated at the beginning of each sampling day per manufacturer's procedures. The meter will be calibrated using NIST standards. The calibration for the pH function will be at least a two point calibration. The meter does have temperature compensation; therefore, temperature differences between the sample and the calibration standards will not be an issue.

The analytical instrument(s) will be calibrated using NIST standards at a frequency per laboratory QA manual and manufacturer's recommendation.

Inspection/Acceptance Requirements for Supplies and Consumables
The field team leader will be responsible for inspecting sample containers before leaving for the field. Only new sample containers will be used. The sample containers will also be inspected for cracks, ill-fitting lids, and other obvious defects before use and will be discarded if defects are found to be present.

The analytical laboratory analyst assigned to conduct the analysis will be responsible for inspecting equipment and supplies upon receipt. The manufacturer's specifications for product performance and purity will be used as the acceptance criteria.

Data Management
Data for this project will be produced in two locations: onsite and at the analytical laboratory. Data collected onsite will be recorded on field data worksheets. These field data worksheets will be retained and maintained by Oxford and will become a part of the project file. Laboratory data will be submitted by the analytical laboratory to the Oxford Project Manager within 30 calendar days of the laboratory's receipt of the samples. The Oxford Project Manager will be responsible for ensuring the analytical report meets the requirements of the Project. Adherence to these procedures will assure that applicable information resource management requirements are satisfied.

C. Assessment and Response Actions
The assessments planned for this project include the verification and validation of all reported data.

The tabular report included with each laboratory data report will include information regarding the quality of the reported laboratory data, which will result from the analytical laboratory's audit of data quality according to the laboratory QA manual. The analytical laboratory will be responsible for corrective actions at the laboratory. The tabular report will include information regarding the quality of the reported field data. These procedures address the process and criteria for evaluating data, and processes for addressing the requirements of specific projects. The Oxford QAM will review the results from the PE sample and all reported data to verify that it is useable for the purposes of this project, and that it is reasonable when taken with other facts known about the site. Section D of this QAPP discusses the verification and validation process.

Reports to Management

Project reporting will include forwarding the reviewed and validated analytical report to the Project Manager. The Project Coordinator will provide the analytical report to the appropriate regulatory authorities in accordance with Project requirements.

Laboratory analytical reports will be generated by the analytical laboratory and submitted to the Oxford Project Manager within 30 calendar days after receipt of the samples who will then forward the analytical information to the Project Coordinator. Any significant QA problems encountered in the laboratory or in the field, as deemed by the analytical laboratory or the Oxford QAM (respectively), will be reported immediately to the Oxford Project Manager via telephone.

D. Data Validation and Usability

Data will be accepted if they meet the following criteria:

1. Field data sheets are complete.
2. Field data and laboratory data were validated
3. Actual sample locations and collection procedures match the proposed sample locations and collection procedures identified in section B.
4. Sample handling procedures documented on chain-of-custody forms, and tabular report match the proposed sample handling procedures identified in section B.
5. Field QC was conducted as planned and meets the acceptance criteria established in section B.

Any deviations from the QAPP are to be reported in the field data sheets or analytical data report and the analytical data report will include the information described in section A.

If the data fails to meet the criteria, they will be flagged by the analytical laboratory Quality Assurance Manager as estimated. Any flagged data will be discussed with the project team to determine if the data point will be rejected and re-sampling done.

Data Validation and Verification

The Oxford QAM will validate the field data according to this plan. Any problems identified during this process will be reported to the Project Coordinator.

The analytical laboratory will validate the laboratory data according to the laboratory QA manual. Any problems identified during this process will be reported to the Oxford QAM in the analytical data report.

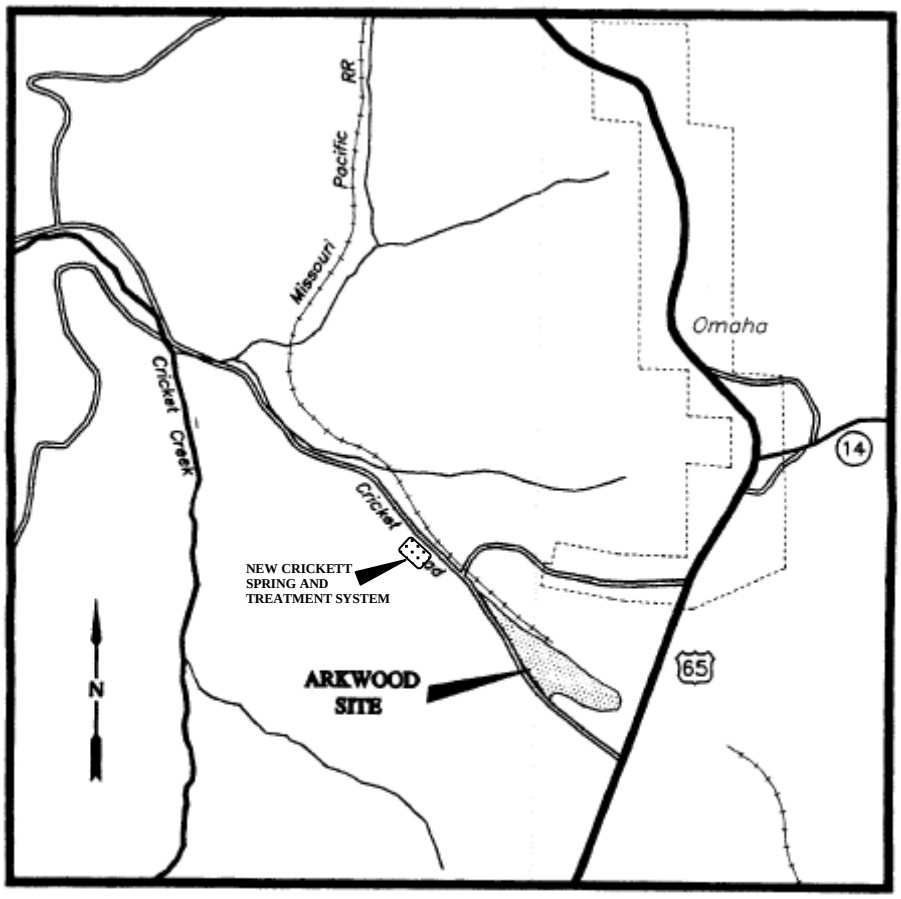
The Oxford QAM will review and verify the field sheets and the analytical data report. Any problems or deviations identified will be discussed with the project team.

Reconciliation with Data Quality Objectives

The Oxford Project Manager will review the analytical data reports and field sheets and reconcile the data with the data quality objectives outlined in this plan. Any significant deviations will be reported to the Project Coordinator, analytical laboratory and the field team to address the deviation(s) and either assure compliance with the plan or make appropriate changes to the plan or underlying documents.

APPENDICES

Diagram of Site Location



GENERAL AREA MAP